NeXtScale nx360 M4

Lenovo Press Product Guide

NeXtScale System is a new dense HPC offering, based on our experience with iDataPlex® and BladeCenter® along with a tight focus on emerging and future client requirements. The NeXtScale n1200 enclosure and NeXtScale nx360 M4 server are designed to optimize density and performance within typical data center infrastructure limits. The 6U NeXtScale n1200 enclosure fits in a standard 19-inch rack and up to twelve nx360 M4 servers can be installed into the enclosure. With more computing power per watt and the latest Intel Xeon processors, you can reduce costs while maintaining speed and availability.

Suggested use: Technical computing, grid deployments, analytics workloads, and large-scale cloud and virtualization infrastructures

The following figure shows twelve NeXtScale nx360 M4 servers that are installed in an NeXtScale n1200 enclosure.

Figure 1. Twelve NeXtScale nx360 M4 servers that are installed in an NeXtScale n1200 enclosure

Did you know?

NeXtScale System is built with industry-standard components to create flexible configurations of servers, chassis, and networking switches that integrate easily in a standard 19-inch rack. It is a general-purpose platform that provides flexibility to clients for creating unique and differentiated solutions using off-the-shelf components. Front-access cabling enables you to quickly and easily make changes in networking, power connections, and storage.

Key features

Introducing NeXtScale System, which is a new generation Intelligent Cluster™ platform that follows on from the highly successful iDataPlex offering.

Designed with industry-standard, off-the-shelf components, NeXtScale System is a general-purpose platform that is designed to give customers a flexible IT infrastructure. The offering initially will be available with compute-intensive systems, but the design allows for a mix-and-match approach, with I/O-rich, storage-rich, and GPU-rich offerings possible. Customized solutions can be configured to provide an application-appropriate platform with a choice of servers, networking switches, adapters, and racks.

This modular system is designed to scale and grow with data center needs to protect and maximize IT investments. Because it is optimized for standard racks, users can easily mix high-density NeXtScale server offerings and non-NeXtScale components within the same rack. NeXtScale System also provides tremendous time to value by enabling users to set up and start it in a shorter period.

The NeXtScale nx360 M4 server provides a dense, flexible solution with a low total cost of ownership (TCO). The half-wide, dual-socket NeXtScale nx360 M4 server is designed for data centers that require high performance but are constrained by floor space. By taking up less physical space in the data center, the NeXtScale server enhances density, and it supports the Intel Xeon E5-2600 v2 series up to 130 W and 12-core processors, thus providing more performance per server. The nx360 M4 compute node contains only essential components in the base architecture to provide a cost-optimized platform.

The nx360 M4 also supports additional expansion options in the form of trays that attach to the top of the server. The Storage Native Expansion Tray can be added to the nx360 M4 to form a storage-dense server supporting up to 32 TB of local storage. The PCIe Native Expansion Tray can be added to the nx360 M4 to form a powerful compute engine, supporting two GPU or coprocessor adapters.

The NeXtScale n1200 Enclosure is an efficient, 6U, 12-node chassis with no built-in networking or switching capabilities, and therefore requires no chassis-level management. Sensibly designed to provide shared, high-efficiency power and cooling for housed servers, the n1200 enclosure is designed to scale with your business needs.

Adding compute capability, or later storage or acceleration capability, is as simple as adding specific nodes to the chassis. Because each node is independent and self-sufficient, there is no contention for resources among nodes within the enclosure. A typical rack holds only 42 1U systems, but this chassis doubles the density (up to 84 compute nodes within the same footprint).

Scalability and performance

The NeXtScale System and the NeXtScale nx360 M4 server offer numerous features to boost performance, improve scalability, and reduce costs:

- Up to 12 compute nodes, each with two of the latest Xeon processors, eight DIMMs, and two PCIe slots, in 6U of rack space. It is a highly dense, scalable, and price-optimized offering.
- The Intel Xeon processor E5-2600 v2 product family improves productivity by offering superior system performance with 12-core processors and up to 3.0 GHz core speeds, up to 25 MB of L3 cache, and QPI interconnect links of up to 8 GTps.
- Two processors, up to 24 cores, and 48 threads maximize the concurrent execution of multi-threaded applications.
- Intelligent and adaptive system performance with Intel Turbo Boost Technology 2.0 allows CPU cores to run at maximum speeds during peak workloads by temporarily going beyond processor thermal design power (TDP).

- Intel Hyper-Threading Technology boosts performance for multi-threaded applications by enabling simultaneous multi-threading within each processor core, up to two threads per core.
- Intel Virtualization Technology integrates hardware-level virtualization hooks that allow operating system vendors to better use the hardware for virtualization workloads.
- Intel Advanced Vector Extensions (AVX) improve floating-point performance for compute-intensive technical and scientific applications.
- Eight DIMMs of registered 1866 MHz DDR3 ECC memory provide speed, high availability, and a memory capacity of up to 256 GB.
- Support for additional local storage with the use of the Storage Native Expansion Tray. When using 4 TB HDDs, you can create an ultra-dense storage server with up to 32 TB of total disk capacity within 1U of comparable rack density. The nx360 M4 with the Storage Native Expansion Tray offers a perfect solution for today's data-intensive workloads.
- Boosts performance with PCIe Native Expansion Tray by offering support for two high-powered GPUs or Intel Xeon Phi coprocessors within a single node .
- The use of solid-state drives (SSDs) instead of or with traditional hard disk drives (HDDs) can improve I/O performance. An SSD can support up to 100 times more I/O operations per second (IOPS) than a typical HDD.
- PCI Express 3.0 I/O expansion capabilities improve the theoretical maximum bandwidth by 60% (8 GTps per link) compared with the previous generation of PCI Express 2.0.
- There is support for 10 Gb Ethernet and FDR mezzanine cards that offer network performance without consuming a PCIe slot.
- With Intel Integrated I/O Technology, the PCI Express 3.0 controller is integrated into the Intel Xeon processor E5 family, which reduces I/O latency and increases overall system performance.

Manageability and security

Powerful systems management features simplify local and remote management of the nx360 M4:

- The server includes an Integrated Management Module II (IMM2) to monitor server availability and perform remote management.
- An integrated industry-standard Unified Extensible Firmware Interface (UEFI) enables improved setup, configuration, and updates, and simplifies error handling.
- Integrated Trusted Platform Module (TPM) 1.2 support enables advanced cryptographic functionality, such as digital signatures and remote attestation.
- Intel Execute Disable Bit functionality can prevent certain classes of malicious buffer overflow attacks when combined with a supporting operating system.
- Intel Trusted Execution Technology provides enhanced security through hardware-based resistance to malicious software attacks, allowing the application to run in its own isolated space that is protected from all other software running on a system.

Energy efficiency

NeXtScale System offers the following energy efficiency features to save energy, reduce operational costs, increase energy availability, and contribute to a green environment:

- Support for S3 standy power states in the processor

- The nx360 M4 is Energy Star 2.0 compliant. Energy Star is the trusted, US government-backed symbol for energy efficiency, with the goal of helping customers save money and protect the environment through energy efficient products and practices. For the Power and Performance Data Sheet, see http://ibm.com/systems/x/hardware/energy-star
- Shared 80 Plus Platinum power supplies ensure energy efficiency.
- Large 80 mm fans maximize air flow efficiencies.
- The Intel Xeon processor E5-2600 v2 product family offers better performance over the previous generation while fitting into the same TDP limits.
- Intel Intelligent Power Capability powers individual processor elements on and off as needed to reduce power draw.
- Low-voltage Intel Xeon processors draw less energy to satisfy demands of power and thermally constrained data centers and telecommunication environments.
- Low-voltage 1.35 V DDR3 memory RDIMMs consume 19% less energy than 1.5 V DDR3 RDIMMs.
- SSDs consume as much as 80% less power than traditional 2.5-inch HDDs.
- The server uses hexagonal ventilation holes in the front and rear of the casing, which can be grouped more densely than round holes, providing more efficient airflow through the system.
- There are power monitoring and power capping capabilities through the Power and Fan Management Module in the chassis

Availability and serviceability

NeXtScale System and the nx360 M4 server provide many features to simplify serviceability and increase system uptime:

- The NeXtScale n1200 chassis supports N+N and N+1 power policies for its six power supplies, which means greater system uptime.
- All components can be removed from the front of the rack by sliding out the trays or the chassis for easy, quick servicing.
- Toolless cover removal provides easy access to upgrades and serviceable parts, such as HDDs and memory.
- The nx360 M4 offers memory mirroring for redundancy if there is a non-correctable memory failure.
- Optional RAID arrays enable the server to keep operating if there is a failure of any one drive.
- SSDs offer better reliability than traditional mechanical HDDs for greater uptime.
- Predictive Failure Analysis (PFA) detects when system components (processors, memory, and hard disk drives) operate outside of standard thresholds and generates proactive alerts in advance of possible failure, therefore increasing uptime.
- The built-in Integrated Management Module II (IMM2) continuously monitors system parameters, triggers alerts, and performs recovering actions in case of failures to minimize downtime.
- The IMM2 offers optional remote management capability to enable remote keyboard, video, and mouse (KVM) control of the server.
- There is a three-year customer replaceable unit and onsite limited warranty, with next business day 9x5. Optional service upgrades are available.

Locations of key components and connectors

The following figure shows the front of the nx360 M4 server.

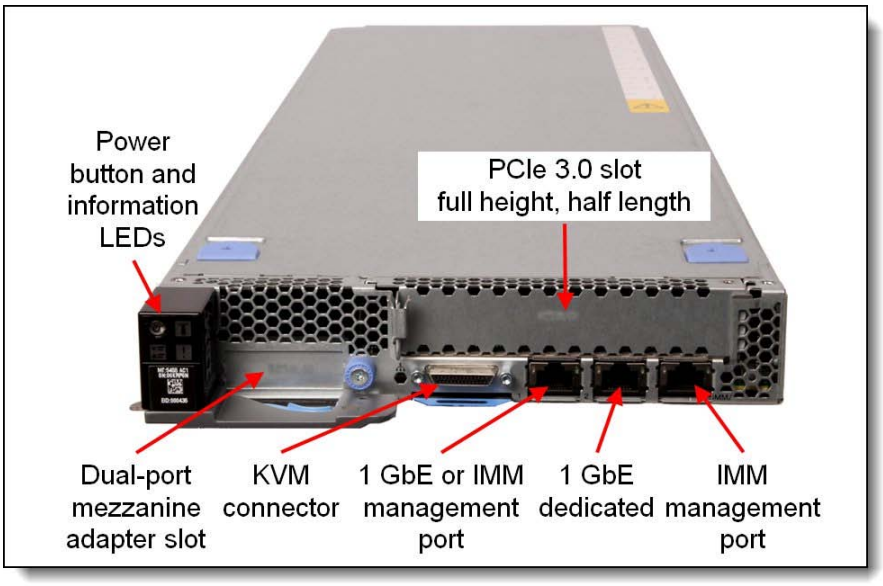
Power button and information LEDs
PCIe 3.0 slot full height, half length
Dual-port mezzanine adapter slot
KVM connector
1 GbE or IMM management port
1 GbE dedicated
IMM management port

Figure 2. Front view of NeXtScale nx360 M4

The following figure shows the locations of key components inside the server.

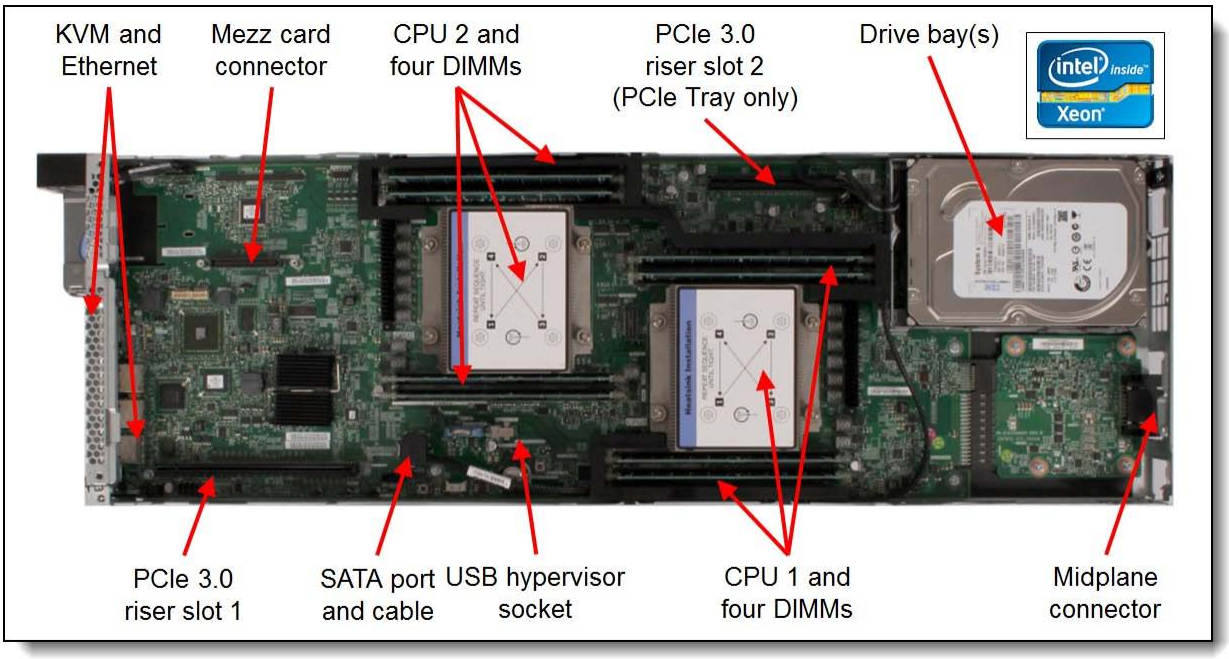

Figure 3. Inside view of the NeXtScale nx360 M4

The compute nodes are installed in the NeXtScale n1200 enclosure, as shown in the following figure.

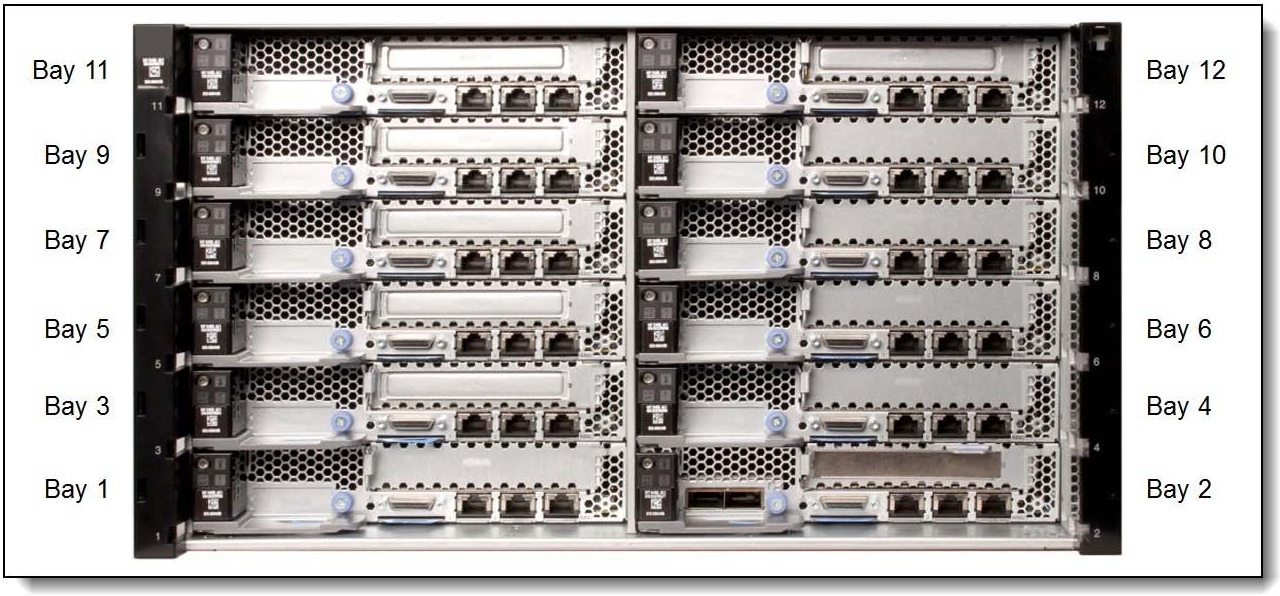

Figure 4. Front view of the NeXtScale n1200 enclosure

The rear of the enclosure contains the power supplies, fans, and the Fan and Power Controller, as shown in the following figure.

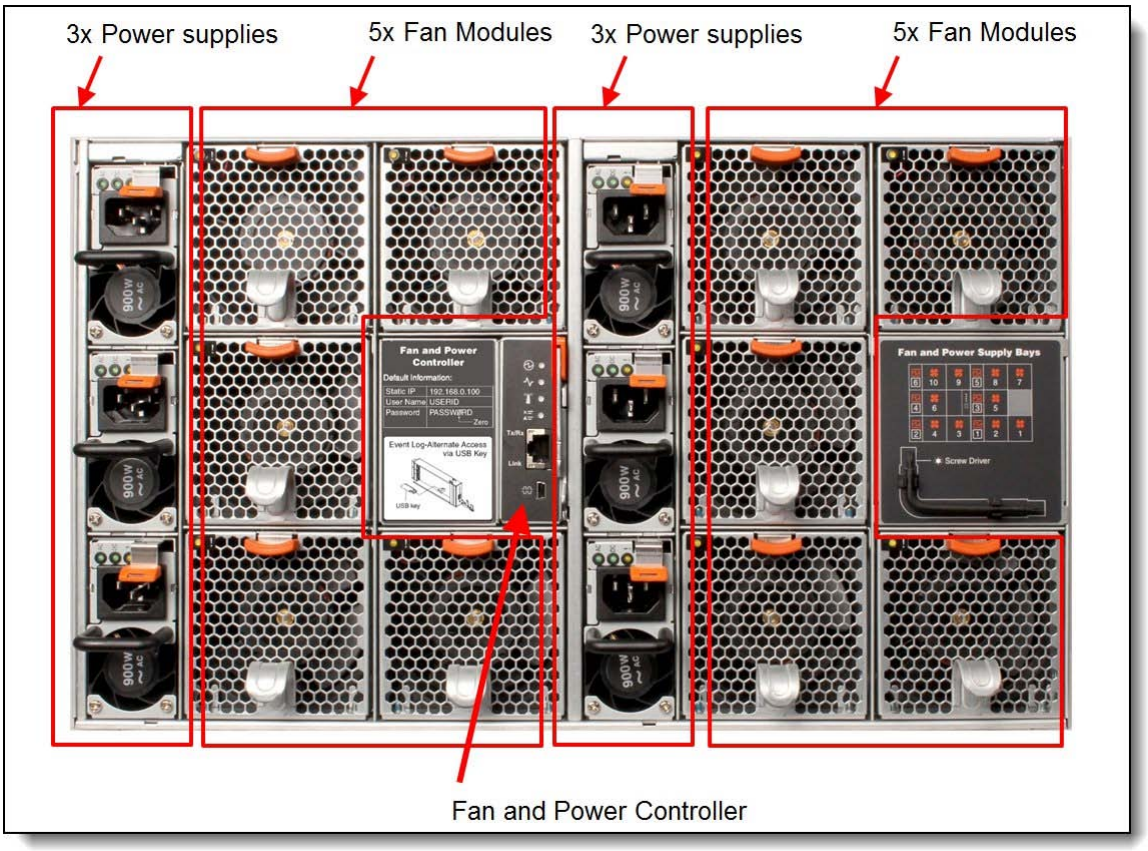

Figure 5. Rear view of the NeXtScale n1200 enclosure

Standard specifications

The following table lists the standard specifications of the NeXtScale nx360 M4 compute node and NeXtScale n1200 enclosure.

Table 1. Standard specifications (part 1)

Components	Specification
Form factor	Standard server: Half-wide, 1U compute node. With optional Native Expansion Tray: Half-wide 2U compute node.
Supported chassis	NeXtScale n1200 enclosure, 6U high; up to 12 compute nodes per chassis.
Processor	Two Intel Xeon Processor E5-2600 V2 series processors; QuickPath Interconnect (QPI) links speed up to 8.0 GTps. Hyper-Threading Technology and Turbo Boost Technology. Intel C602J (Patsburg-J) chipset. 4-core processors up to 3.5 GHz and 15 MB L3 cache 6-core processors up to 3.5 GHz and 25 MB L3 cache 8-core processors up to 3.3 GHz and 25 MB L3 cache 10-core processors up to 3.0 GHz and 25 MB L3 cache 12-core processors up to 2.7 GHz and 30 MB L3 cache
Memory	Up to 8 DIMM sockets (4 DIMMs per processor) supporting DDR3 DIMMs up to 1866 MHz memory speeds. RDIMMs, UDIMMs and LRDIMMs supported. Four memory channels per processor (one DIMM per channel).
Memory maximums	Up to 256 GB with 8x 32 GB LRDIMMs and two processors.
Memory protection	ECC, memory mirroring, and memory sparing.
Disk drive bays	Inside the nx360 M4: One 3.5-inch simple-swap SATA or two 2.5-inch simple swap SAS/SATA HDDs or SSDs, or four 1.8-inch simple-swap SSDs. Not front accessible. Adding the NeXtScale Storage Native Expansion Tray adds 7 more 3.5-inch simple-swap drive bays.
Maximum internal storage	With the Storage Native Expansion Tray: 32 TB using 8x 4TB 3.5-inch drives. Without the Storage Native Expansion Tray: 4.0 TB using 1x 4TB 3.5-inch drive.
RAID support	On some models: ServeRAID C100 6Gb SATA controller supporting RAID 0, RAID 1, and RAID 10. Implemented in the Intel C600 chipset. Optional hardware RAID with supported 6Gbps RAID controllers.
Optical drive bays	No internal bays; use an external USB drive. See http://support.lenovo.com/en/documents/pd011281 for options.
Tape drive bays	No internal bays. Use an external USB drive.
Network interfaces	Two Gigabit Ethernet ports using onboard Intel I350 Gb Ethernet controller. Optionally, two InfiniBand ports or two 10 GbE ports through a mezzanine card (which does not occupy the available PCIe slot).
PCI Expansion slots	nx360 M4 without PCIe Native Expansion Tray: ● One PCIe 3.0 x8 mezzanine card slot ● One PCIe 3.0 x16 full-height half-length slot nx360 M4 with PCIe Native Expansion Tray: ● One PCIe 3.0 x8 mezzanine card slot ● One PCIe 3.0 x8 full-height half-length slot ● Two PCIe 3.0 x16 full-height full-length double-width slots

Table 1. Standard specifications (part 2)

Components	Specification
Ports	Front of the server: KVM connector; with the addition of a console breakout cable (1 cable standard with the chassis) supplies one RS232 serial port, one VGA port, and two USB ports for local console connectivity. Three 1 Gbps Ethernet ports with RJ45 connectors: one dedicated for systems management (wired to the IMM), one dedicated for use by the operating system, and one shared by the IMM and the operating system. One slot for an optional mezzanine card ports (QSFP, SFP+, or RJ45, depending on the card installed). One internal USB port for VMware ESXi hypervisor key. Rear of the enclosure, provided by the Fan and Power Controller for chassis management: Gb Ethernet connection (RJ45) for remote management
Cooling	Supplied by the NeXtScale n1200 enclosure. 10 hot-swap dual-rotor 80 mm system fans with tool-less design.
Power supply	Supplied by the NeXtScale n1200 enclosure. Up to six hot-swap power supplies either 900W or 1300W depending on the chassis model. Support power policies N+N or N+1 power redundancy. 80 PLUS Platinum certified.
Systems management	UEFI, Integrated Management Module II (IMM2) with Renesas SH7757 controller, Predictive Failure Analysis, Light Path Diagnostics, Automatic Server Restart, and ServerGuide. Browser-based chassis management through an Ethernet port on the Fan and Power Controller at the rear of the enclosure. IMM2 upgrades are available to IMM2 Standard and IMM2 Advanced for web GUI and remote presence features.
Video	Matrox G200eR2 video core with 16 MB DDR3 video memory integrated into the IMM2. Maximum resolution is 1600x1200 with 16M colors (32 bpp) at 75 Hz, or 1680x1050 with 16M colors at 60 Hz.
Security features	Power-on password, administrator's password, and Trusted Platform Module 1.2.
Operating systems supported	Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Microsoft Windows Server 2008 R2 and 2008, and VMware vSphere Hypervisor.
Limited warranty	Three-year customer-replaceable unit and onsite limited warranty with 9x5/NBD.
Service and support	Optional service upgrades are available through ServicePac®: 4-hour or 2-hour response time, 8-hour fix time, 1-year or 2-year warranty extension, remote technical support for Lenovo hardware and some Lenovo and OEM software.
Dimensions	NeXtScale nx360 M4 server: Width: 216 mm (8.5 in.), height: 41 mm (1.6 in.), depth: 659 mm (25.9 in.) NeXtScale n1200 enclosure: Width: 447 mm (17.6 in.), height: 263 mm (10.4 in.), depth: 915 mm (36 in.)
Weight	NeXtScale nx360 M4 maximum weight: 6.05 kg (13.31 lb) NeXtScale n1200 enclosure: Fully configured (stand-alone): 112 kg (247 lb), empty chassis 28 kg (62 lb)

The nx360 M4 servers are shipped with the following items:

- Statement of Limited Warranty
- Important Notices
- Documentation CD that contains the *Installation and Service Guide*

Standard models

The following table lists the standard models.

Table 2. Standard models

Model	Intel Xeon Processor† (2 maximum)	Memory and speed	RAID controller	Drive bays	Disks	Network	Optical
5455-22x	2x E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	2x 4 GB 1600 MHz	6 Gbps SATA (No RAID)	1x 3.5-inch SS bay	Open	2x GbE	None
5455-42x	2x E5-2660 v2 10C 2.2GHz 25MB 1866MHz 95W	2x 8 GB 1866 MHz	6 Gbps SATA (No RAID)	1x 3.5-inch SS bay	Open	2x GbE	None
5455-62x	2x E5-2670 v2 10C 2.5GHz 25MB 1866MHz 115W	2x 8 GB 1866 MHz	ServeRAID C100	2x 2.5-inch SS bays	Open	2x GbE	None

† Processor detail: Processor quantity and model, cores, core speed, L3 cache, memory speed, and power consumption.

For information about the standard features of the server, see the "Standard specifications" section.

NeXtScale n1200 Enclosure support

The NeXtScale nx360 M4 is supported in the NeXtScale n1200 Enclosure. The number of servers supported in each chassis depends on the thermal design power (TDP) value of the processors used in the servers (Table 5), the number and capacity of power supplies installed (1300 W or 900 W) and the AC input voltage (100-127V or 200-240V). The following tables use the following conventions:

- A green cell means that the chassis can be filled with servers up to the maximum number supported in the chassis (ie 12 servers without GPU Trays installed, 6 servers with GPU Trays installed).
- A yellow cell means that the maximum number of servers that the chassis can hold is fewer than the total available bays. Other bays in the chassis *must* remain empty.

Notes on the tables:

- OVS (Oversubscription) of the power system allows for more efficient use of the available system power. By using oversubscription, users can make the most of the extra power from the redundant power supplies when the power supplies are in healthy condition.
- Oversubscription and Power supply redundancy options are set via one of the available user interfaces to the Fan and Power Controller in the chassis.
- Use the Power Configurator to determine an accurate power model for your configuration: http://ibm.com/systems/bladecenter/resources/powerconfig.html
- Some cells indicate two numbers (for example “5 + 1”). This indicates support for a mixture of servers with and without the GPU Tray:
  - First number: Number of servers with a GPU Tray attached and two GPUs installed
  - Second number: Number of servers without a GPU Tray attached.

  For example, “5 + 1” means Supported combination is 5 servers with the GPU Tray attached (consuming 10 bays in the chassis), plus 1 server without a GPU Tray attached (1 bay). In such a configuration 11 bays are consumed and the 1 remaining server bay in the chassis must remain empty.

- The tables are as follows:
  - Table 3 - 1300 W power supplies, 200-240V AC input, no GPU Trays
  - Table 4 - 1300 W power supplies, 200-240V AC input, GPU Trays with 130 W GPUs
  - Table 5 - 1300 W power supplies, 200-240V AC input, GPU Trays with 225 W GPUs
  - Table 6 - 1300 W power supplies, 200-240V AC input, GPU Trays with 235 W GPUs
  - Table 7 - 1300 W power supplies, 200-240V AC input, GPU Trays with 300 W GPUs
  - Table 8 - 900 W power supplies, 200-240V AC input, no GPU Trays
  - Table 9 - 900 W power supplies, 100-127V AC input, no GPU Trays
- See the GPU and coprocessor adapters section for information on the power consumption of each supported GPU or coprocessor.

Table 3. Number of compute nodes supported (200-240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
50 W	1	12	12	12	12
	2	12	12	12	12
60 W	1	12	12	12	12
	2	12	12	12	12
70 W	1	12	12	12	12
	2	12	12	12	12
80 W	1	12	12	12	12
	2	12	12	12	12
95 W	1	12	12	12	12
	2	12	12	10	12
115 W	1	12	12	12	12
	2	12	12	8	12
130 W	1	12	12	12	12
	2	12	12	7	11

Table 4. Number of compute nodes supported each with two 130 W GPUs installed (200-240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
50 W	1	6	6	6	6
	2	6	6	6	6
60 W	1	6	6	6	6
	2	6	6	6	6
70 W	1	6	6	6	6
	2	6	6	6	6
80 W	1	6	6	6	6
	2	6	6	6	6
95 W	1	6	6	6	6
	2	6	6	5 + 1	6
115 W	1	6	6	6	6
	2	6	6	5	6
130 W	1	6	6	5 + 1	6
	2	6	6	4 + 1	5 + 1

Table 5. Number of compute nodes supported each with two 225 W GPUs installed (200-240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
50 W	1	6	6	5 + 1	6
	2	6	6	5	6
60 W	1	6	6	5	6
	2	6	6	4 + 1	5 + 1
70 W	1	6	6	5	6
	2	6	6	4 + 1	5 + 1
80 W	1	6	6	5	6
	2	6	6	4 + 1	5 + 1
95 W	1	6	6	4 + 2	6
	2	6	6	4	5
115 W	1	6	6	4 + 1	5 + 1
	2	6	6	3 + 1	4 + 1
130 W	1	6	6	4 + 1	5
	2	6	6	3 + 1	4 + 1

Table 6. Number of compute nodes supported each with two 235 W GPUs installed (200-240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
50 W	1	6	6	5 + 1	6
	2	6	6	4 + 1	6
60 W	1	6	6	5	6
	2	6	6	4 + 1	5 + 1
70 W	1	6	6	5	6
	2	6	6	4 + 1	5 + 1
80 W	1	6	6	5	6
	2	6	6	4 + 1	5 + 1
95 W	1	6	6	4 + 2	5 + 1
	2	6	6	4	5
115 W	1	6	6	4 + 1	5 + 1
	2	6	6	3 + 1	4 + 1
130 W	1	6	6	4	5
	2	6	6	3 + 1	4

Table 7. Number of compute nodes supported each with two 300 W GPUs installed (200-240 V AC Input, with 6 x 1300 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
50 W	1	6	6	4 + 2	5 + 1
	2	6	6	4	5
60 W	1	6	6	4	5
	2	6	6	3 + 2	4 + 2
70 W	1	6	6	4	5
	2	6	6	3 + 2	4 + 2
80 W	1	6	6	4	5
	2	6	6	3 + 2	4 + 2
95 W	1	6	6	4	4 + 2
	2	6	6	3 + 1	4 + 1
115 W	1	6	6	3 + 2	4 + 2
	2	6	5 + 1	3	3 + 2
130 W	1	6	6	3 + 2	4 + 1
	2	6	5 + 1	3	3 + 2

Table 8. Number of compute nodes supported (200-240 V AC Input, with 6 x 900 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
50 W	1	12	12	12	12
	2	12	12	11	12
60 W	1	12	12	12	12
	2	12	12	10	12
70 W	1	12	12	12	12
	2	12	12	8	11
80 W	1	12	12	11	12
	2	12	12	8	9
95 W	1	12	12	10	12
	2	12	12	6	10
115 W	1	12	12	8	10
	2	12	10	5	8
130 W	1	12	12	7	9
	2	10	8	4	7

Table 9. Number of compute nodes supported (100-127 V AC Input, with 6 x 900 W PSUs)

CPU TDP	Number of CPUs	Non-redundant or N+1 with OVS	N+1	N+N	N+N with OVS
50 W	1	12	12	9	11
	2	12	12	6	10
60 W	1	12	12	7	9
	2	12	9	5	7
70 W	1	12	12	7	9
	2	12	9	5	7
80 W	1	12	12	6	8
	2	10	9	5	7
95 W	1	12	11	6	7
	2	9	7	4	6
115 W	1	11	9	5	6
	2	7	6	3	5
130 W	1	9	8	4	5
	2	6	5	3	4

NeXtScale n1200 Enclosure models

The standard n1200 Enclosure models are listed in the following table.

Table 10. Standard enclosure models

Model	Description	Fans (standard / max)	Power (standard / max)
5456-A2x	NeXtScale n1200 Enclosure	10x 80mm / 10	6x 900 W / 6
5456-A3x	NeXtScale n1200 Enclosure	10x 80mm / 10	2x 1300 W / 6
5456-A4x	NeXtScale n1200 Enclosure	10x 80mm / 10	6x 1300 W / 6

The chassis ships with these items:

- Rail kit (88Y6763)
- Four detachable chassis lift handles
- One Console breakout cable (also known as a KVM Dongle)
- A Torx-8 (T8) screwdriver for use with components such as drive cages, mounted on the rear of the chassis
- One AC power cord for each power supply installed, 1.5m 10A, IEC320 C14 to C13 (part number 39Y7937)

The n1200 provides a shared high-efficiency power supply and fans. Like BladeCenter and Flex System™, the NeXtScale System compute nodes connect to a midplane, but this connection is for power and control only; the midplane does not provide any I/O connectivity.

Processor options

The nx360 M4 supports the processor options that are listed in the following table.

Table 11. Processor options

Part number	Feature code*	Intel Xeon processors**	Where used
00FL128	A55N / A55W	Intel Xeon Processor E5-2603 v2 4C 1.8GHz 10MB 1333MHz 80W	-
00FL129	A55P / A55X	Intel Xeon Processor E5-2609 v2 4C 2.5GHz 10MB 1333MHz 80W	-
00Y8687	A4MF / A4MK	Intel Xeon Processor E5-2618L v2 6C 2.0GHz 15MB 1333MHz 50W	-
46W2712	A425 / A42F	Intel Xeon Processor E5-2620 v2 6C 2.1GHz 15MB 1600MHz 80W	22x
00FL130	A55Q / A55Y	Intel Xeon Processor E5-2628L v2 8C 2.2GHz 20MB 1600MHz 70W	-
00FL234	A55T / A561	Intel Xeon Processor E5-2630 v2 6C 2.6GHz 15M 1600MHz 80W	-
00FL131	A55R / A55Z	Intel Xeon Processor E5-2630L v2 6C 2.4GHz 15MB 1600MHz 60W	-
00Y8632	A4MD / A4MH	Intel Xeon Processor E5-2637 v2 4C 3.5GHz 15MB 1866MHz 130W	-
46W2719	A42B / A42M	Intel Xeon Processor E5-2640 v2 8C 2.0GHz 20MB 1600MHz 95W	-
00FL126	A55L / A55U	Intel Xeon Processor E5-2643 v2 6C 3.5GHz 25MB 1866MHz 130W	-
00Y8686	A4ME / A4MJ	Intel Xeon Processor E5-2648L v2 10C 2.0GHz 25MB 1866MHz 70W	-
46W2713	A426 / A42G	Intel Xeon Processor E5-2650 v2 8C 2.6GHz 20MB 1866MHz 95W	-
00FL132	A55S / A560	Intel Xeon Processor E5-2650L v2 10C 1.7GHz 25M 1600MHz 70W	-
00Y8688	A4MG / A4ML	Intel Xeon Processor E5-2658 v2 10C 2.4GHz 25MB 1866MHz 95W	-
46W2714	A427 / A42H	Intel Xeon Processor E5-2660 v2 10C 2.2GHz 25MB 1866MHz 95W	42x
00FL127	A55M / A55V	Intel Xeon Processor E5-2667 v2 8C 3.3GHz 25MB 1866MHz 130W	-
46W2715	A428 / A42J	Intel Xeon Processor E5-2670 v2 10C 2.5GHz 25MB 1866MHz 115W	62x
46W2716	A429 / A42K	Intel Xeon Processor E5-2680 v2 10C 2.8GHz 25MB 1866MHz 115W	-
46W2717	A42A / A42L	Intel Xeon Processor E5-2690 v2 10C 3.0GHz 25MB 1866MHz 130W	-
46W2720	A42C / A42N	Intel Xeon Processor E5-2695 v2 12C 2.4GHz 30MB 1866MHz 115W	-
46W2721	A42D / A42P	Intel Xeon Processor E5-2697 v2 12C 2.7GHz 30MB 1866MHz 130W	-

* The first feature code corresponds to the first processor; the second feature code corresponds to the second processor.
** Processor detail: Model, core speed, cores, L3 cache, memory speed, and TDP power.

Memory options

Lenovo DDR3 memory is compatibility tested and tuned for optimal System x® performance and throughput. Lenovo memory specifications are integrated into the light path diagnostics for immediate system performance feedback and optimum system uptime. From a service and support standpoint, Lenovo memory automatically assumes the system warranty, and Lenovo provides service and support worldwide.

The NeXtScale nx360 M4 supports DDR3 memory. The server supports up to four DIMMs when one processor is installed and up to eight DIMMs when two processors are installed. Each processor has four memory channels, and there is one DIMM per memory channel (1 DPC). RDIMM, UDIMM and LRDIMM are supported, but the mixing of these different types is not supported.

The following table lists the memory options that are available for the nx360 M4 server.

Table 12. Memory options

Part number	Feature code	Description	Maximum supported	Models where used
UDIMMs				
00D5012	A3QB	4GB (1x4GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP UDIMM	8	-
RDIMMs - 1866 MHz				
00D5028	A3QF	4GB (1x4GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	8	-
00D5040	A3QJ	8GB (1x8GB, 2Rx8, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	8	42x, 62x
00D5048	A3QL	16GB (1x16GB, 2Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP RDIMM	8	-
RDIMMs - 1600 MHz				
00D5024	A3QE	4GB (1x4GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	8	-
46W0735	A3ZD	4GB (1x4GB, 2Rx8, 1.35V) PC3-12800 CL13 ECC DDR3 1600MHz LP RDIMM	8	22x
00D5036	A3QH	8GB (1x8GB, 1Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	8	-
00D5044	A3QK	8GB (1x8GB, 2Rx8, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	8	-
46W0672	A3QM	16GB (1x16GB, 2Rx4, 1.35V) PC3L-12800 CL11 ECC DDR3 1600MHz LP RDIMM	8	-
LRDIMMs				
46W0761	A47K	32GB (1x32GB, 4Rx4, 1.5V) PC3-14900 CL13 ECC DDR3 1866MHz LP LRDIMM	8	-

In the nx360 M4, the maximum memory speed of a configuration is the lower of the following two values:

- The memory speed of the processor (See Table 4 above)
- The memory speed of the DIMM (See Table 5 below)

The server supports both 1.5 V and 1.35 V DIMMs. Mixing 1.5 V and 1.35 V DIMMs in the same server is supported. In such a case, all DIMMs operate at 1.5 V.

The following memory protection technologies are supported:

- ECC
- Memory mirroring

The following table shows the maximum memory speeds that are achievable. The table also shows the maximum memory capacity at any speed that is supported by the DIMM and the maximum memory capacity at the rated DIMM speed.

Table 13. Maximum memory speeds

Spec	**UDIMMs**	**RDIMMs**			**LRDIMMs**
Rank	Dual rank	Single rank	Dual rank		Quad rank
Part numbers	00D5012 (4GB)	00D5024 (4GB) 00D5036 (8GB)	46W0735 (4GB) 00D5044 (8GB) 46W0672 (16GB)	00D5028 (4GB) 00D5040 (8GB) 00D5048 (16GB)	46W0761 (32GB)
Rated speed	1600 MHz	1600 MHz	1600 MHz	1866 MHz	1866 MHz
Rated voltage	1.35V	1.35 V	1.35 V	1.5 V	1.5 V
Operating voltage	1.35 V or 1.5 V	1.35 V or 1.5 V	1.35 V or 1.5 V	1.5 V	1.5 V
Max quantity*	8	8	8	8	8
Largest DIMM	4 GB	8 GB	16 GB	16 GB	32 GB
Max memory capacity	32 GB	64 GB	128 GB	128 GB	256 GB
Max memory at rated speed	32 GB	64 GB	128 GB	128 GB	256 GB
Maximum operating speed (MHz)					
1 DIMM per channel	1600 MHz	1600 MHz	1600 MHz	1866 MHz	1866 MHz

* The maximum quantity that is supported is shown for two installed processors. When one processor is installed, the maximum quantity that is supported is half of that shown.

NeXtScale Storage Native Expansion Tray

The NeXtScale Storage Native Expansion Tray is a half-wide 1U expansion tray that attaches to the nx360 M4 to provide seven extra 3.5-inch simple-swap SATA drives. The tray allows the configuration of storage-rich nx360 M4 compute nodes.

Note: The Storage Native Expansion Tray and the PCIe Native Expansion Tray cannot be connected to the same compute node.

The following figure shows the storage tray attached to an nx360 M4

Figure 6. NeXtScale Storage Native Expansion Tray attached to an nx360 M4 compute node

Ordering information is listed in the following table.

Table 14. Ordering information

Part number	Feature code	Description
00Y8546	A4GD	NeXtScale Storage Native Expansion Tray

The following figure shows the NeXtScale Storage Native Expansion Tray with the cover removed showing seven 3.5-inch drives installed.

Figure 7. NeXtScale Storage Native Expansion Tray

When the Storage Native Expansion Tray is used, one of the following disk controller adapters must be installed in the PCIe slot in the nx360 M4:

- ServeRAID M1115 SAS/SATA Controller for System x, 81Y4448
- N2115 SAS/SATA HBA for System x, 46C8988

Internal storage

The NeXtScale nx360 M4 server supports one of the following drives internally in the server:

- One 3.5-inch simple-swap SATA drive
- Two 2.5-inch simple-swap HDDs or SSDs
- Four 1.8-inch simple-swap SSDs

In addition, the nx360 M4 supports seven additional 3.5-inch drive bays if the NeXtScale Storage Native Expansion Tray is attached. The Storage Native Expansion Tray can be used with any of the above three internal drive configurations to provide the following bay combinations:

- Eight 3.5-inch simple-swap SATA drives
- Seven 3.5-inch simple-swap SATA drives and two 2.5-inch simple-swap SATA HDDs
- Seven 3.5-inch simple-swap SATA drives and four 1.8-inch simple-swap SSDs

Drive cages for the drives internal to the nx360 M4 are as listed in the following table. Drives used in the Storage Native Expansion Tray do not need a cage.

Table 15. Drive cages for the drive bay in the nx360 M4

Part number	Feature code	Description	Models where used
46W2731	A41N	nx360 M4 1.8-inch SSD Cage Assembly	-
46W2728	A41K	nx360 M4 2.5-inch HDD Cage Assembly	62x
46W2727	A41J	nx360 M4 3.5-inch HDD Cage Assembly	22x, 42x
00Y8615	A4GE	3.5" HDD RAID cage for nx360 M4 Storage Native Expansion Tray	-

The following figure shows the three variations (the two 3.5-inch cages look similar).

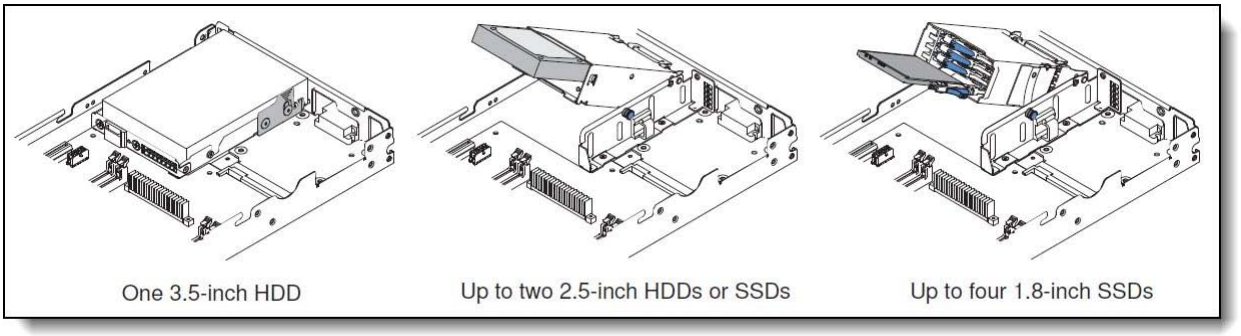

Figure 8. Drive bay options

There are two 3.5-inch drive cages - the last two rows of the above table. If the Storage Native Expansion Tray is attached to the nx360 M4, then the use of the RAID cage (feature A4GE, option 00Y8615) allows you to configure a RAID array that spans all 8 drives - the 7 in the storage tray and the 1 drive internal to the nx360 M4. Such a configuration would be connected either to a ServeRAID M1115 adapter or N2115 SAS HBA.

If the 3.5-inch HDD cage (feature A41J) is used, then a RAID array can only be formed with the 7 drives in the storage tray. In such a configuration, the drives in the storage tray are connected either to a ServeRAID M1115 adapter or N2115 SAS HBA, and the single drive in the nx360 M4 is connected to the ServeRAID C100.

Controllers for internal storage

The following table lists the RAID controllers and SAS HBA that are used for internal disk storage of the nx360 M4 server. These are alternatives to the onboard SATA controller and one may be required depending on the storage configuration.

Table 16. Drive controllers for internal storage

Part number	Feature code	Description
RAID controllers		
81Y4448	A1MZ	ServeRAID M1115 SAS/SATA Controller for System x
81Y4492	A1XL	ServeRAID H1110 SAS/SATA Controller for System x
46C8988	A3MW	N2115 SAS/SATA HBA for System x
None	A17T	ServeRAID C100 for System x*
Features on Demand Upgrades - ServeRAID M1115		
81Y4542	A1X1	ServeRAID M1100 Series Zero Cache/RAID 5 Upgrade

* Windows and Linux only. No support for VMware, Hyper-V, or Xen

The following table lists the adapters that are supported for each drive configuration.

Table 17. Drive type and RAID adapter support

Drive type	Quantity of drives supported	Software RAID or no RAID			Hardware RAID	
		On board SATA	ServeRAID C100	N2115 HBA	ServeRAID H1110	ServeRAID M1115
Without Storage Native Expansion Tray attached (one controller)						
1.8-inch SS SATA SSD	4	No	Yes	Yes	Yes	Yes
2.5-inch SS SATA HDD	2	No	Yes	Yes	Yes	Yes
2.5-inch SS SAS HDD	2	No	No	Yes	Yes	Yes
3.5-inch SS SATA HDD	1	Yes	No	No	No	No
With Storage Native Expansion Tray attached (adds 7x 3.5-inch bays) (two controllers)**						
1.8-inch SS SATA SSD	4 + 7	No	Yes	Yes	No	Yes
2.5-inch SS SATA HDD	2 + 7	No	Yes	Yes	No	Yes
3.5-inch SS SATA HDD	1 + 7	Yes	Yes	Yes	No	Yes
With Storage Native Expansion Tray attached (adds 7x 3.5-inch bays) (one controller)†						
3.5-inch SS SATA HDD	8†	No	No	Yes	No	Yes

* With the addition of the NeXtScale Storage Native Expansion Tray
** The two controllers must be: (1) either onboard SATA or ServeRAID C100 for internal drive(s), and (2) N2115 or ServeRAID M115 for drives in the storage tray
† Requires the 3.5-inch RAID cage (feature A4GE, option 00Y8615)

Using the ServeRAID C100 with 1.8-inch SSDs

The on-board ServeRAID C100 SATA controller provides four channels, two at 3 Gbps and two at 6 Gbps. These connect to the four 1.8-inch drive bays in the nx360 M4. When installing only two 1.8-inch drives, install them in the top two drive bays to maximize performance, since the top two bays are the ones operating at 6 Gbps.

When four 1.8-inch SS SATA SSD drives are installed, the two located at the top of the cage will operate at 6 Gbps while the two at the bottom will operate at 3 Gbps. An array involving drives at different speeds, will perform at the lowest speed. For example, a paired array between top drives will operate at 6 Gbps but, a paired array between a top drive and a bottom, will operate at 3 Gbps.

Controller use in conjunction with the Storage Native Expansion Tray

When the Storage Native Expansion Tray is used one of the following disk controller adapters must be installed in the PCIe slot in the nx360 M4.

- ServeRAID M1115 SAS/SATA Controller for System x, 81Y4448
- N2115 SAS/SATA HBA for System x, 46C8988

If you are using the ServeRAID M1115 controller and you have a 3.5-inch drive in the internal bay of the nx360 M4, and you wish to be able to form a RAID array with all 8 drives (1 in the server and 7 in the storage tray), then you must use the 3.5-inch RAID cage for the internal drive (feature A4GE, option 00Y8615), replacing the standard 3.5-inch HDD cage if already installed in the server. The 3.5-inch RAID cage includes a backplane that allows the internal drive to be connected to the drives in the storage tray.

If you do not use the 3.5-inch RAID cage or you are using 2.5-inch or 1.8-inch drives in the nx360 M4, then the internal drives will be connected to a separate controller than the drives in the storage tray and you will not be able to form a RAID array spanning both internal drives and drives in the storage tray. The internal drives are connected to the ServeRAID C100 controller as indicated in the above table.

Note: It is not a supported combination to have the Storage Native Expansion Tray with 7 drives along with two 2.5-inch SAS drives installed in the nx360 M4. This is because the ServeRAID C100 (which would be required to drive the two internal drives) does not support SAS drives. The use of 2.5-inch SATA drives are supported however.

Controller specifications

The ServeRAID H1110 adapter has the following specifications:

- Four internal 6 Gbps SAS/SATA ports.
- One x4 mini-SAS internal connector (SFF-8087).
- 6 Gbps throughput per port.
- Based on LSI SAS2004 6 Gbps RAID on Chip (ROC) controller.
- PCIe 2.0 x4 host interface.
- Supports RAID 0, 1, 1E, and 10.
- SAS and SATA drives are supported, but the mixing of SAS and SATA in the same integrated volume is not supported.
- Supports up to two integrated volumes.
- Supports up to two global hot-spare drives.
- Supports drive sizes greater than 2 TB for RAID 0, 1E, and 10 (not RAID 1).
- Fixed stripe size of 64 KB.

The ServeRAID M1115 adapter has the following specifications:

- Eight internal 6 Gbps SAS/SATA ports
- Two x4 mini-SAS internal connectors (SFF-8087)
- Supports RAID levels 0, 1, and 10
- Supports RAID levels 5 and 50 with optional M1100 Series RAID 5 upgrade, 81Y4542
- 6 Gbps throughput per port
- PCIe 3.0 x8 host interface
- Based on the LSI SAS2008 6 Gbps ROC controller

The N2115 SAS/SATA HBA has the following features and specifications:

- LSI SAS2308 6 Gbps I/O controller
- PCI low profile, half-length - MD2 form factor
- PCI Express 3.0 x8 host interface
- Eight internal 6 Gbps SAS/SATA ports (support for 6, 3, or 1.5 Gbps speeds)
- Up to 6 Gbps throughput per port
- Two internal x4 Mini-SAS connectors (SFF-8087)
- Non-RAID (JBOD mode) support for SAS and SATA HDDs and SSDs (RAID not supported)
- Optimized for SSD performance
- High-performance IOPS LSI Fusion-MPT architecture
- Advanced power management support
- Support for SSP, SMP, STP, and SATA protocols
- End-to-End CRC with Advanced Error Reporting
- T-10 Protection Model for early detection of and recovery from data corruption
- Spread Spectrum Clocking for EMI reductions

The ServeRAID C100 is an integrated SATA controller with software RAID capabilities. It is a cost-effective way to provide reliability, performance, and fault-tolerant disk subsystem management to help safeguard your valuable data and enhance availability.

The ServeRAID C100 has the following specifications:

- Supports RAID levels 0, 1, and 10
- Onboard SATA controller with software RAID capabilities
- Supports SATA HDDs and SATA SSDs
- Offers two 6 Gbps SATA ports and two 3 Gbps SATA ports
- Support for up to two virtual drives
- Support for virtual drive sizes greater than 2 TB
- Fixed stripe unit size of 64 KB
- Support for MegaRAID Storage Manager management software

Note: The ServeRAID C100 is supported by Windows and Linux only. Depending on the operating system version, drivers might need to be downloaded separately. There is no support for VMware, Hyper-V, or Xen. The C100 supports SATA drives but does not support SAS drives.

For more information, see the list of Lenovo Press Product Guides in the RAID adapters category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=raid

Internal drive options

The following table lists hard disk drive options for the internal disk storage of the nx360 M4 server.

Rules for mixing drive types:

- Mixing HDDs: Simple-swap SATA HDDs and simple-swap SAS HDDs can be intermixed in the system, but cannot be intermixed in the same RAID array.
- Mixing HDDs and SSDs: Both simple-swap SATA HDDs and simple-swap SAS HDDs can be intermixed with SSDs in the system. SAS or SATA HDDs cannot be configured with SSDs within the same RAID array.

Table 18. Disk drive options for internal disk storage (Part 1)

Part number	Feature code	Description	Maximum supported
3.5-inch simple-swap SATA HDDs			
00AD005	A486	500GB 7.2K 6Gbps SATA 3.5" HDD for NeXtScale System	1 / 8*
00AD010	A487	1TB 7.2K 6Gbps SATA 3.5" HDD for NeXtScale System	1 / 8*
00AD015	A488	2TB 7.2K 6Gbps SATA 3.5" HDD for NeXtScale System	1 / 8*
00AD020	A489	3TB 7.2K 6Gbps SATA 3.5" HDD for NeXtScale System	1 / 8*
00AD025	A4GC	4TB 7.2K 6Gbps SATA 3.5" HDD for NeXtScale System	1 / 8*
3.5-inch simple-swap NL SATA HDDs			
00FN123	A5VV	2TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NextScale System	1 / 8*
00FN138	A5VW	3TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NextScale System	1 / 8*
00FN153	A5VX	4TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NextScale System	1 / 8*
00FN168	A5VY	5TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NextScale System	1 / 8*
00FN183	A5VZ	6TB 7.2K 6Gbps NL SATA 3.5" 512e HDD for NextScale System	1 / 8*
2.5-inch simple-swap 10K SAS HDDs			
00AD055	A48D	300GB 10K 6Gbps SAS 2.5" HDD for NeXtScale System	2
00AD060	A48F	600GB 10K 6Gbps SAS 2.5" HDD for NeXtScale System	2
00AD065	A48G	900GB 10K 6Gbps SAS 2.5" HDD for NeXtScale System	2
00FN040	A5NC	1.2TB 10K 6Gbps SAS 2.5" HDD for NeXtScale System	2
2.5-inch simple-swap 15K SAS HDDs			
00AD045	A48E	146GB 15K 6Gbps SAS 2.5" HDD for NeXtScale System	2
00AD050	A48H	300GB 15K 6Gbps SAS 2.5" HDD for NeXtScale System	2
00AJ290	A5NG	600GB 15K 6Gbps SAS 2.5" HDD for NeXtScale System	2

* 1 drive supported without the Storage Native Expansion Tray. 8 drives supported with the Storage Native Expansion Tray.

Table 18. Disk drive options for internal disk storage (Part 2)

Part number	Feature code	Description	Maximum supported
2.5-inch simple-swap SATA HDDs			
00AD030	A48A	250GB 7.2K 6Gbps SATA 2.5" HDD for NeXtScale System	2
00AD035	A48B	500GB 7.2K 6Gbps SATA 2.5" HDD for NeXtScale System	2
00AD040	A48C	1TB 7.2K 6Gbps SATA 2.5" HDD for NeXtScale System	2
2.5-inch simple swap SAS-SSD Hybrid			
00AJ315	A58T	600GB 10K 6Gbps SAS 2.5" Hybrid for NeXtScale System	2
2.5-inch simple-swap Enterprise Value SSDs			
00FN020	A57K	120GB SATA 2.5" MLC Enterprise Value SSD for NeXtScale	2
00FN025	A57L	240GB SATA 2.5" MLC Enterprise Value SSD for NeXtScale	2
00FN030	A57M	480GB SATA 2.5" MLC Enterprise Value SSD for NeXtScale	2
00FN035	A57N	800GB SATA 2.5" MLC Enterprise Value SSD for NeXtScale	2
00FN293	A5U8	S3500 1.6TB SATA 2.5" MLC Enterprise Value SSD for NextScale System	2
1.8-inch simple-swap Enterprise SSDs			
00W1120	A3HQ	100GB SATA 1.8" MLC Enterprise SSD	4

* 1 drive supported without the Storage Native Expansion Tray. 8 drives supported with the Storage Native Expansion Tray.

For information about SSDs, see the Lenovo Press Product Guides in the Internal Storage category, available from:
http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=internalstorage

Internal tape drives

The server does not support internal tape drive options.

Optical drives

The server does not support internal optical drive options. Instead, use an external USB drive. See http://support.lenovo.com/en/documents/pd011281 for options.

NeXtScale PCIe Native Expansion Tray

The NeXtScale PCIe Native Expansion Tray is a half-wide 1U expansion tray that attaches to the nx360 M4 to provide two full-height full-length double-width PCIe 3.0 x16 slots. The tray is designed to support two GPU adapters or coprocessors.

Note: The PCIe Native Expansion Tray and the Storage Native Expansion Tray cannot be connected to the same compute node.

The following figure shows the PCIe Native Expansion Tray attached to an nx360 M4 (shown with the top cover removed). The figure shows two NVIDIA GPUs installed.

Figure 9. NeXtScale PCIe Native Expansion Tray attached to an nx360 M4 compute node

Ordering information is listed in the following table.

Table 19. Ordering information

Part number	Feature code	Description
00Y8393	A4MB	NeXtScale PCIe Native Expansion Tray

When the PCIe Native Expansion Tray is used, it is connected to the compute node via two riser cards, each providing a PCIe x16 connector to the GPUs or coprocessors installed in the tray.

- 2-slot PCIe 3.0 x24 riser card installed in the front riser slot (riser slot 1 - see Figure 3). This riser card replaces the standard 1-slot riser used to connect standard PCIe cards internal to the compute node. The 2-slot riser card offers these connection:
  - PCIe 3.0 x8 slot for the slot internal to the compute node
  - PCIe 3.0 x16 slots for the front adapter in the PCIe Native Expansion Tray
- 1-slot PCIe 3.0 x16 riser card installed in the rear riser slot (riser slot 2 - see Figure 3). This riser is used to connect the rear adapter in the PCIe Native Expansion Tray.

Only GPUs and coprocessors are supported in the PCIe Native Expansion Tray and only those listed in the following section. The PCIe Native Expansion Tray also includes the auxiliary power connectors and cables for each adapter slot necessary for each supported GPU and coprocessor.

GPU and coprocessor adapters

The nx360 M4 supports GPU adapters and coprocessors when the NeXtScale PCIe Native Expansion Tray is attached, as described in "NeXtScale PCIe Native Expansion Tray" The following table lists the supported adapters.

The operating systems supported by each GPU and coprocessor adapter is listed in the "Supported operating systems" section.

Configuration rules are as follows:

- The use of GPUs or coprocessors require the use of the NeXtScale PCIe Native Expansion Tray
- One or two GPUs or coprocessors can be installed
- If two GPU adapters or coprocessors are installed, they must be identical
- 1300W power supplies are required in the chassis
- 200-240 Vac utility power is required - 100-127 Vac is not supported

Table 20. GPU adapters and coprocessors

Part number	Feature code	Description	Power consumption	Maximum supported
00J6163	A3GQ	Intel Xeon Phi 5110P	225 W	2
00J6162	A3GP	Intel Xeon Phi 7120P	300 W	2
00J6160	A3GM	NVIDIA GRID K1	130W	2
00J6161	A3GN	NVIDIA GRID K2	225 W	2
00D4192	A36S	NVIDIA Tesla K10	225 W	2
00J6165	A3J8	NVIDIA Tesla K20X	225 W	2
00FL133	A564	NVIDIA Tesla K40	235 W	2

Network adapters

The nx360 M4 offers two Gigabit Ethernet ports with the following features:

- Intel I350 Gb Ethernet controller
- IEEE 802.3 Ethernet interface for 1000BASE-T, 100BASE-TX, and 10BASE-T applications (802.3, 802.3u, and 802.3ab)
- IPv6 Offloads: Checksum and LSO
- Wake on LAN support
- Virtualization: I/OAT, VMDq (8 queues per port), and SR-IOV (PCI SIG compliant)
- 16 TX & 16 RX queues per port
- Supports MSI-X
- Supports SGMII, SCTP, NC-SI
- Supports IEEE 1588 (TimeSynch) per packet
- Supports Energy Efficient Ethernet

The nx360 M4 server also supports an additional mezzanine card with a dedicated PCIe x8 slot at the front of the server, as shown in Figure 2. The supported adapters are listed in the following table.

Table 21. Mezzanine adapters

Part number	Feature code	Description
10 Gb Ethernet Mezzanine Card		
00Y7730	A4MC	Emulex Dual Port 10GbE SFP+ Embedded VFA IIIr for System x
90Y5178	A2TE	Emulex Mezz VFA III/IIIr FCoE/iSCSI License for System x (FoD) (Features on Demand upgrade for 00Y7730)
49Y7980	A3JS	Intel X520 Dual Port 10GbE SFP+ Embedded Adapter for System x
49Y7990	A3JT	Intel X540 Dual Port 10GBase-T Embedded Adapter for System x
90Y6454	A22H	QLogic Dual Port 10GbE SFP+ Embedded VFA for System x
90Y5179	A2TF	QLogic Embedded VFA FCoE/iSCSI License for System x (FoD) (Features on Demand upgrade for 90Y6454)
InfiniBand Mezzanine Card		
00AM476	A4WA	Dual Port FDR10/QDR embedded adapter for nx360 M4
00D4143	A36R	Dual Port FDR Embedded Adapter

The following table lists additional supported network adapters in the standard full-height half-length PCIe slot.

Table 22. Network adapters

Part number	Feature code	Description
40 Gb Ethernet / InfiniBand		
00D9550	A3PN	Mellanox ConnectX-3 40GbE / FDR IB VPI Adapter for System x
10 Gb Ethernet		
44T1370	A5GZ	Broadcom NetXtreme 2x10GbE BaseT Adapter for System x
94Y5180	A4Z6	Broadcom NetXtreme Dual Port 10GbE SFP+ Adapter for System x
49Y7910	A18Y	Broadcom NetXtreme II Dual Port 10GBaseT Adapter for System x
00JY820	A5UT	Emulex VFA5 2x10 GbE SFP+ PCIe Adapter for System x
00JY830	A5UU	Emulex VFA5 2x10 GbE SFP+ Adapter and FCoE/iSCSI SW
None*	AS3M	Emulex VFA5 2x10 GbE SFP+ Integrated Adapter for System x
00JY824	A5UV	Emulex VFA5 FCoE/iSCSI SW for PCIe Adapter for System x (FoD) (Features on Demand upgrade for 00JY820 and feature AS3M)
00D8540	A4XH	Emulex Dual Port 10GbE SFP+ VFA IIIr for System x
95Y3760	A2U2	Emulex VFA III/IIIr FCoE/iSCSI License for System x (FoD) (Features on Demand upgrade for 00D8540)
49Y7960	A2EC	Intel X520 Dual Port 10GbE SFP+ Adapter for System x
81Y3520	AS73	Intel X710 2x10GbE SFP+ Adapter for System x
00D9690	A3PM	Mellanox ConnectX-3 10 GbE Adapter for System x
42C1800	5751	QLogic 10Gb CNA for System x
47C9952	A47H	Solarflare SFN5162F 2x10GbE SFP+ Performant Adapter for System x
47C9960	A47J	Solarflare SFN6122F 2x10GbE SFP+ Onload Adapter for System x
47C9977	A522	Solarflare SFN7122F 2x10GbE SFP+ Flareon Ultra for System x
Gigabit Ethernet		
90Y9352	A2V3	Broadcom NetXtreme I Quad Port GbE Adapter for System x
90Y9370	A2V4	Broadcom NetXtreme I Dual Port GbE Adapter for System x
49Y4230	5767	Intel Ethernet Dual Port Server Adapter I340-T2 for System x
49Y4240	5768	Intel Ethernet Quad Port Server Adapter I340-T4 for System x
00AG500	A56K	Intel I350-F1 1xGbE Fiber Adapter for System x
00AG510	A56L	Intel I350-T2 2xGbE BaseT Adapter for System x
00AG520	A56M	Intel I350-T4 4xGbE BaseT Adapter for System x

* Available only via CTO or special bid.

For more information, see the list of Lenovo Press Product Guides in the Network adapters category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=networkadapters

Storage host bus adapters

The following table lists the storage HBAs that are supported by the nx360 M4 server.

Table 23. Storage adapters

Part number	Feature code	Description
Fibre Channel - 16 Gb		
81Y1668	A2XU	Brocade 16Gb FC Single-port HBA for System x
81Y1675	A2XV	Brocade 16Gb FC Dual-port HBA for System x
81Y1655	A2W5	Emulex 16Gb FC Single-port HBA for System x
81Y1662	A2W6	Emulex 16Gb FC Dual-port HBA for System x
00Y3337	A3KW	QLogic 16Gb FC Single-port HBA for System x
00Y3341	A3KX	QLogic 16Gb FC Dual-port HBA for System x
Fibre Channel - 8 Gb		
46M6049	3589	Brocade 8Gb FC Single-port HBA for System x
46M6050	3591	Brocade 8Gb FC Dual-port HBA for System x
42D0485	3580	Emulex 8Gb FC Single-port HBA for System x
42D0494	3581	Emulex 8Gb FC Dual-port HBA for System x
42D0501	3578	QLogic 8Gb FC Single-port HBA for System x
42D0510	3579	QLogic 8Gb FC Dual-port HBA for System x
SAS		
46C9010	A3MV	N2125 SAS/SATA HBA for System x
00AE912	A5M0	N2225 SAS/SATA HBA for System x
00AE916	A5M1	N2226 SAS/SATA HBA for System x

For more information, see the list of Lenovo Press Product Guides in the Host Bus Adapters category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=hba

PCIe SSD adapters

The server does not support High IOPS SSD adapters.

Power supplies

The NeXtScale n1200 enclosure supports up to six redundant hot-plug power supplies, providing N+N or N+1 redundancy Power policies with no redundancy is also supported. These High Efficiency (HE) Platinum AC power supplies are 80 PLUS Platinum certified to allow for the best efficiency values of your data center. The following table lists the supported power supply option.

Table 24. Power supplies

Part number	Feature code	Description	Min / Max supported	Chassis model where used
00Y8569	A41T	CFF 900W Power Supply	6 / 6	A2x
00Y8652	A4MM	CFF 1300W Power Supply	2 / 6	A3x, A4x

The power supply options have the following features:

- Supports N+N or N+1 Power Redundancy, or Non-redundant power configurations to support higher density
- Power management controller and configured through the Fan and Power Controller
- Integrated 2500 RPM fan
- 80 PLUS Platinum certified
- Built-in overload and surge protection

900W power supply specifications:

- Supports dual-range voltage: 100 - 240 V
- 100 - 127 (nominal) V AC; 50 or 60 Hz; 6.8 A (maximum)
- 200 - 240 (nominal) V AC; 50 or 60 Hz; 5.0 A (maximum)

1300W power supply specifications:

- Supports high-range voltage only: 200 - 240 V
- 200 - 240 (nominal) V AC; 50 or 60 Hz; 6.9 A (maximum)

Integrated virtualization

The server supports VMware vSphere (ESXi), which is installed on a USB memory key. The key is installed in a USB socket inside the server. The following table lists the virtualization options.

Customized VMware vSphere images can be downloaded from:
http://ibm.com/systems/x/os/vmware/

Table 25. Virtualization options

Part number	Feature code	Description	Maximum supported
41Y8298	A2G0	Blank USB Memory Key for VMware ESXi Downloads	1
41Y8382	A4WZ	USB Memory Key for VMware ESXi 5.1 Update 1	1
41Y8385	A584	USB Memory Key for VMware ESXi 5.5	1

Local server management

The nx360 M4 provides local console access through the KVM connector on the front of the server. A console breakout cable is used with this connector which provides a VGA port, two USB ports and a DB9 serial port. The cable is shown in the following figure.

Figure 10. Console breakout cable

One console breakout cable is shipped with the NeXtScale n1200 enclosure. Additional cables can be ordered per the following table.

Table 26. Console breakout cable

Part number	Feature code	Description	Maximum supported
00Y8366	A4AK	Console breakout cable (KVM Dongle cable)	1

Tip: This is the same cable that is used with Flex System, but has a different part number because of the included materials.

To aid with problem determination, the server includes light path diagnostics, which is a set of LEDs on the front of the server and inside the server that show you which component is failing. The LEDs are shown in the following figure.

Figure 11. Power button and system LEDs

When an error occurs, the system error LED lights up. Review the logs through the web interface of the IMMv2 (see the "Remote server management" section). If needed, power off the server and remove it from the enclosure. Then, press and hold the power button to activate the system board LEDs. The LED next to the failed component lights up.

Remote server management

The server contains Integrated Management Module II (IMM2), which provides advanced service-processor control, monitoring, and an alerting function. If an environmental condition exceeds a threshold or if a system component fails, the IMM2 lights LEDs to help you diagnose the problem, records the error in the event log, and alerts you to the problem. The server includes IMM2 Basic and can be upgraded to IMM2 Standard and IMM2 Advanced with FoD licenses; however, you might need to upgrade the system firmware to the latest levels (at least level 28n) to support these upgrades.

IMM2 Basic has the following features:

- Industry-standard interfaces and protocols
- Intelligent Platform Management Interface (IPMI) Version 2.0
- Common Information Model (CIM)
- Advanced Predictive Failure Analysis (PFA) support
- Continuous health monitoring
- Shared Ethernet connection
- Domain Name System (DNS) server support
- Dynamic Host Configuration Protocol (DHCP) support
- Embedded Dynamic System Analysis (DSA)
- LAN over USB for in-band communications to the IMM
- Serial over LAN
- Remote power control
- Server console serial redirection

IMM2 Standard (as enabled using the Feature on Demand software license key using part number 90Y3900) has the following features in addition to the IMM2 Basic features:

- Remote access through a secure web console
- Access to server vital product data (VPD)
- Automatic notification and alerts
- Continuous health monitoring and control
- Email alerts
- Syslog logging support
- Enhanced user authority levels
- Event logs that are time stamped, saved on the IMM, and that can be attached to email alerts
- OS watchdogs
- Remote configuration through Advanced Settings Utility (ASU)
- Remote firmware updating
- User authentication using a secure connection to a Lightweight Directory Access Protocol (LDAP) server

IMM2 Advanced (as enabled using the Feature on Demand software license key using part number 90Y3901) adds the following features on top of those of IMM Standard:

- Remotely viewing video with graphics resolutions up to 1600x1200 at 75 Hz with up to 23 bits per pixel color depths, regardless of the system state
- Remotely accessing the server using the keyboard and mouse from a remote client
- Mapping the CD or DVD drive, diskette drive, and USB flash drive on a remote client, and mapping ISO and diskette image files as virtual drives that are available for use by the server
- Uploading a diskette image to the IMM memory and mapping it to the server as a virtual drive

The blue-screen capture feature captures the video display contents before the IMM restarts the server when the IMM detects an operating-system hang condition. A system administrator can use the blue-screen capture to assist in determining the cause of the hang condition.

The following table lists the remote management options.

Note: The IMM2 Advanced upgrade requires the IMM2 Standard upgrade.

Table 27. Remote management options

Part number	Feature codes	Description	Maximum supported
90Y3900	A1MK	Integrated Management Module Standard Upgrade	1
90Y3901	A1ML	Integrated Management Module Advanced Upgrade (requires Standard Upgrade, 90Y3900)	1

The nx360 M4 provides a dedicated Ethernet port that allows connection to the IMM2. It is a port to access the IMM2 separately from the onboard two-port 1 Gb Ethernet controller. Alternatively, the first 1 Gb Ethernet port from the onboard controller can be configured in Shared mode in order to allow access to the IMM2. With Shared mode enabled, the dedicated IMM port is disabled.

Remote enclosure management

The NeXtScale n1200 Enclosure offers a remote management capability through the Fan and Power Controller, which is at the back of the enclosure.

Figure 12. Fan and Power Controller

The Fan and Power Controller has one external RJ45 port which provides a 10/100 Mbps Ethernet connection for browser-based remote control.

The port provide the following interfaces:

- An HTTP (web browser) interface for remote management
- An IPMI interface to the IMM in each server
- An IPMI interface to higher managers, such as xCAT

The module provides the following functions:

- Power supply redundancy and over-subscription configuration
- Power capping/saving configuration
- Power restore policy
- Acoustic mode setting
- Configuration/log export to USB (a USB port is provided inside the module; see the diagram in Figure 8.)
- IMM remote reset or Server remote reseat (AC cycle)
- Status monitor: Power consumption, node status, power supply status, fan status
- Network configuration

The FPC also includes a USB key housed in side the unit. The USB key stores the event log for the FPC plus power, cooling and network configuration data.

Supported operating systems

The server supports the following operating systems:

- Microsoft Windows Server 2008 HPC Edition
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2012
- Microsoft Windows Server 2012 R2
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 7
- SUSE Enterprise Linux Server (SLES) 12
- SUSE LINUX Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 12 with XEN
- VMware vSphere 5.0 (ESXi)
- VMware vSphere 5.1 (ESXi)
- VMware vSphere 5.5 (ESXi)

For the latest information about the specific versions and service levels that are supported and any other prerequisites, see the ServerProven® website:
http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/nos/matrix.shtml

The following table lists the operating system support for GPUs and coprocessors.

Table 28. Operating system support for GPU and coprocessor adapters

Operating system	NVIDIA Tesla K10	NVIDIA Tesla K40m	NVIDIA Tesla K20X	NVIDIA Grid K1	NVIDIA Grid K2	Intel Xeon Phi 7120P	Intel Xeon Phi 5110P
Microsoft Windows Server 2008 R2 (SP1)	Y	Y	Y	Y*	Y*	Y	Y
Microsoft Windows Server 2008 HPC Edition	Y	Y	Y	N	N	N	N
Microsoft Windows Server 2012	Y	Y	Y	Y*	Y*	Y	Y
Microsoft Windows Server 2012 R2	Y	Y	Y	Y*	Y*	Y	Y
SUSE LINUX Enterprise Server 11 for AMD64/EM64T (SP3)	Y	Y	Y	N	N	Y	Y
Red Hat Enterprise Linux 5 Server x64 Edition (U10)	Y*	Y*	Y*	N	N	N	N
Red Hat Enterprise Linux 6 Server x64 Edition (U5)	Y	Y	Y	N	N	Y	Y
VMware vSphere (ESXi) 5.0 (U3)	N	N	N	N	N	N	N
VMware vSphere (ESXi) 5.1 (U2)	N	N	N	Y	Y	N	N
VMware vSphere (ESXi) 5.5	N	N	N	Y	Y	N	N

* Support is planned

Physical and electrical specifications

NeXtScale nx360 M4 dimensions:

- Width: 216 mm (8.5 in.)
- Height: 41 mm (1.6 in.)
- Depth: 659 mm (25.9 in.)
- Maximum weight: 6.05 kg (13.31 lb)

NeXtScale n1200 enclosure dimensions:

- Width: 447 mm (17.6 in.)
- Height: 263 mm (10.4 in.)
- Depth: 915 mm (36 in.)
- Fully configured (stand-alone): 112 kg (247 lb), empty chassis 28 kg (62 lb)

Supported environment

The NeXtScale nx360 M4 compute node complies with ASHRAE class A3 specifications.

- Power on:
  - Temperature: 5 °C - 40 °C (41 °F - 104 °F)
  - Humidity, non-condensing: -12 °C dew point (10.4 °F) and 8% - 85% relative humidity
  - Maximum dew point: 24 °C (75 °F)
  - Maximum altitude: 3048 m (10,000 ft)
  - Maximum rate of temperature change: 5 °C/hr (41 °F/hr)

- Power off:
  - Temperature: 5 °C to 45 °C (41 °F to 113 °F)
  - Relative humidity: 8% - 85%
  - Maximum dew point: 27 °C (80.6 °F)

- Storage (non-operating):
  - Temperature: 1 °C to 60 °C (33.8 °F to 140 °F)
  - Altitude: 3050 m (10,006 ft)
  - Relative humidity: 5% - 80%
  - Maximum dew point: 29 °C (84.2 °F)

- Shipment (non-operating):
  - Temperature: -40 °C to 60 °C (-40 °F to 140 °F)
  - Altitude: 10,700 m (35,105 ft)
  - Relative humidity: 5% - 100%
  - Maximum dew point: 29 °C (84.2 °F)

Electrical requirements

- 100 - 127 (nominal) V AC; 50 Hz or 60 Hz; 6.8 A
- 200 - 240 (nominal) V AC; 50 Hz or 60 Hz; 5.0 A
- Input kilovolt-amperes (kVA) (approximately):
  - Minimum configuration: 0.1 kVA
  - Maximum configuration: 6.0 kVA

BTU output

- Minimum configuration: 341 Btu/hr (100 watts)
- Maximum configuration: 20,471 Btu/hr (6,000 watts)

Noise level

- 7.0 bels (idle)

Regulatory compliance

The server conforms to the following international standards:

- Energy Star 2.0
- FCC - Verified to comply with Part 15 of the FCC Rules, Class A
- Canada ICES-003, issue 5, Class A
- UL/IEC 60950-1
- CSA C22.2 No. 60950-1
- NOM-019
- Argentina IEC60950-1
- Japan VCCI, Class A
- IEC 60950-1 (CB Certificate and CB Test Report)
- China CCC GB4943.1, GB9254, Class A, and GB17625.1
- Taiwan BSMI CNS13438, Class A; CNS14336-1
- Australia/New Zealand AS/NZS CISPR 22, Class A; AS/NZS 60950.1
- Korea KN22, Class A, KN24
- Russia/GOST ME01, IEC-60950-1, GOST R 51318.22, and GOST R 51318.24,
- GOST R 51317.3.2, GOST R 51317.3.3
- IEC 60950-1 (CB Certificate and CB Test Report)
- CE Mark (EN55022 Class A, EN60950-1, EN55024, and EN61000-3-2,
- EN61000-3-3)
- CISPR 22, Class A
- TUV-GS (EN60950-1/IEC 60950-1, and EK1-ITB2000)

Warranty options

The NeXtScale nx360 M4 and NeXtScale n1200 enclosure have a 3-year onsite warranty with 9x5/next business day terms. Lenovo offers the warranty service upgrades through ServicePac offerings. The ServicePac is a series of prepackaged warranty maintenance upgrades and post-warranty maintenance agreements with a well-defined scope of services, including service hours, response time, term of service, and service agreement terms and conditions.

ServicePac offerings are country-specific. Each country might have its own service types, service levels, response times, and terms and conditions. Not all covered types of ServicePac offerings might be available in a particular country. For more information about ServicePac offerings that are available in your country, visit the ServicePac Product Selector:

https://www-304.ibm.com/sales/gss/download/spst/servicepac

The following table explains warranty service definitions in more detail.

Table 29. Warranty service definitions

Term	Description
Onsite repair	A service technician comes to the server's location for equipment repair.
24x7x2 hour	A service technician is scheduled to arrive at your customer's location within two hours after remote problem determination is completed. We provide service around the clock, every day, including holidays.
24x7x4 hour	A service technician is scheduled to arrive at your customer's location within four hours after remote problem determination is completed. We provide service around the clock, every day, including holidays.
9x5x4 hour	A service technician is scheduled to arrive at your customer's location within four business hours after remote problem determination is completed. We provide service from 8:00 a.m. - 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding holidays. If after 1:00 p.m. it is determined that onsite service is required, the customer can expect the service technician to arrive the morning of the following business day. For noncritical service requests, a service technician arrives by the end of the following business day.
9x5 next business day	A service technician is scheduled to arrive at your customer's location on the business day after we receive your call, following remote problem determination. We provide service from 8:00 a.m. - 5:00 p.m. in the customer's local time zone, Monday through Friday, excluding holidays.

In general, these are the types of ServicePac offerings:

- Warranty and maintenance service upgrades
  - One, 2, 3, 4, or 5 years of 9x5 or 24x7 service coverage
  - Onsite repair from next business day to 4 or 2 hours
  - One or 2 years of warranty extension
- Remote technical support services
  - One or three years with 24x7 coverage (severity 1) or 9x5/next business day for all severities
  - Installation and startup support for System x servers
  - Remote technical support for System x servers
  - Software support - Support Line
    - Microsoft or Linux software
    - VMware

Rack cabinets

The NeXtScale n1200 enclosure is supported in the following racks:

- 42U 1100 mm Enterprise V2 Deep Dynamic Rack
- 42U 1100 mm Dynamic Enterprise V2 Expansion Rack

For more information, see the list of Lenovo Press Product Guides in the Rack cabinets and options category:
http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack

Rack options

The server supports the rack console switches and monitor kits that are listed in the following table.

Table 30. Rack options

Part number	Feature code	Description
Monitor kits and keyboard trays		
17238BX	1723HC1 fc A3EK	1U 18.5" Standard Console
17238EX	1723HC1 fc A3EL	1U 18.5" Enhanced Media Console
172317X	1723HC1 fc 0051	1U 17in Flat Panel Console Kit
172319X	1723HC1 fc 0052	1U 19in Flat Panel Console Kit
Console switches		
3858D3X	3858HC1 fc A4X1	Avocent Universal Management Gateway 6000
1754D2X	1754HC2 fc 6695	Global 4x2x32 Console Manager (GCM32)
1754D1X	1754HC1 fc 6694	Global 2x2x16 Console Manager (GCM16)
1754A2X	1754HC4 fc 0726	Local 2x16 Console Manager (LCM16)
1754A1X	1754HC3 fc 0725	Local 1x8 Console Manager (LCM8)
Console cables		
00AK142	A4X4	UM KVM Module VGA+SD Dual RJ45
43V6147	3757	Single Cable USB Conversion Option (UCO)
39M2895	3756	USB Conversion Option (4 Pack UCO)
39M2897	3754	Long KVM Conversion Option (4 Pack Long KCO)
46M5383	5341	Virtual Media Conversion Option Gen2 (VCO2)
46M5382	5340	Serial Conversion Option (SCO)

For more information, see the list of Lenovo Press Product Guides in the Rack cabinets and options category:
http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=rack

External disk storage expansion

The server supports attachment to external storage expansion enclosures, such as the EXP2500 series, by using either the ServeRAID M5120 (6 Gbps) or M5225 (12 Gbps) SAS/SATA Controller.

Table 31. RAID controller and features for external locally attached storage

Part number	Feature code	Description
RAID controller		
00AE938	A5ND	ServeRAID M5225-2GB SAS/SATA Controller for System x
81Y4478	A1WX	ServeRAID M5120 SAS/SATA Controller for System x
Hardware upgrades for M5120		
81Y4487	A1J4	ServeRAID M5100 Series 512MB Flash/RAID 5 Upgrade for System x
81Y4559	A1WY	ServeRAID M5100 Series 1GB Flash/RAID 5 Upgrade for System x
Features on Demand Upgrades for M5120*		
81Y4546*	A1X3	ServeRAID M5100 Series RAID 6 Upgrade for System x
90Y4273*	A2MC	ServeRAID M5100 Series SSD Performance Key for System x
90Y4318*	A2MD	ServeRAID M5100 Series SSD Caching Enabler for System x

* Use of any of the FoD upgrades for the M5120 requires one of the hardware upgrades - 81Y4487 or 81Y4559

The ServeRAID M5120 SAS/SATA Controller has the following specifications:

- Eight external 6 Gbps SAS/SATA ports
- Up to 6 Gbps throughput per port
- Two external x4 mini-SAS connectors (SFF-8088)
- Supports RAID 0, 1, and 10
- Supports RAID 5 and 50 with optional M5100 Series RAID 5 upgrades
- Supports RAID 6 and 60 with the optional M5100 Series RAID 6 upgrade
- Supports 512 MB battery-backed cache or 512 MB or 1 GB flash-backed cache (cache)
- PCIe 3.0 x8 host interface
- Based on the LSI SAS2208 6 Gbps ROC controller
- Supports connectivity to the EXP2512 and EXP2524 storage expansion enclosures

For more information, see the Lenovo Press Product Guide *ServeRAID M5120 SAS/SATA Controller for* System x, TIPS0858:
http://www.redbooks.ibm.com/abstracts/tips0858.html?Open

The ServeRAID M5225 SAS/SATA Controller has the following specifications:

- Eight external 12 Gbps SAS/SATA ports
- Supports 12, 6, and 3 Gbps SAS and 6 and 3 Gbps SATA data transfer rates
- Two external x4 mini-SAS HD connectors (SFF-8644)
- Supports 2 GB flash-backed cache (standard)
- Supports RAID levels 0, 1, 5, 10, and 50 (standard)
- Supports RAID 6 and 60 with the optional M5200 Series RAID 6 Upgrade
- Supports optional M5200 Series Performance Accelerator and SSD Caching upgrades
- PCIe x8 Gen 3 host interface
- Based on the LSI SAS3108 12 Gbps ROC controller
- Supports connectivity to the EXP2512 and EXP2524 storage expansion enclosures

The controllers supports connectivity to the external expansion enclosures that are listed in the following table. Up to nine expansion enclosures can be daisy-chained per one adapter port. For better performance, distribute expansion enclosures evenly across both adapter ports.

Table 32. External expansion enclosures

Part number	Description	Maximum quantity supported per one M5225
610012X	EXP2512 Storage Enclosure	17
610024X	EXP2524 Storage Enclosure	9

The external SAS cables listed in the following table support connectivity between external expansion enclosures and the controller.

Table 33. External SAS cables for external storage expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
ServeRAID M5120 - Server to Expansion enclosure connectivity (Mini-SAS x4 to Mini-SAS x4)		
39R6531	3 m SAS Cable	1
39R6529	1 m SAS Cable	1
ServeRAID M5225 - Server to Expansion enclosure connectivity (Mini-SAS HD x4 to Mini-SAS x4)		
00MJ162	0.6m SAS Cable (mSAS HD to mSAS)	1
00MJ163	1.5m SAS Cable (mSAS HD to mSAS)	1
00MJ166	3m SAS Cable (mSAS HD to mSAS)	1
Expansion enclosure to Expansion enclosure connectivity (Mini-SAS x4 to Mini-SAS x4)		
39R6529	1 m SAS Cable	1
39R6531	3 m SAS Cable	1

The following table lists the drives that are supported by EXP2512 external expansion enclosures.

Table 34. Drive options for EXP2512 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
3.5" NL SAS HS HDDs		
00NC555	2TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
00NC557	3TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12
00NC559	4TB 7,200 rpm 6Gb SAS NL 3.5" HDD	12

The following table lists the hard disk drives that are supported by EXP2524 external expansion enclosures.

Table 35. Drive options for EXP2524 external expansion enclosures

Part number	Description	Maximum quantity supported per one enclosure
2.5" NL SAS HS HDDs		
00NC571	1TB 7,200 rpm 6Gb SAS NL 2.5" HDD	24
2.5" SAS HS HDDs		
00NC561	146GB 15,000 rpm 6Gb SAS 2.5" HDD	24
00NC563	300GB 15,000 rpm 6Gb SAS 2.5" HDD	24
00NC565	600GB 10,000 rpm 6Gb SAS 2.5" HDD	24
00NC567	900GB 10,000 rpm 6Gb SAS 2.5" HDD	24
00NC569	1.2TB 10,000 rpm 6Gb SAS 2.5" HDD	24
2.5" SAS HS SSDs		
00NC573	200GB 6Gb SAS 2.5" SSD	24
00NC575	400GB 6Gb SAS 2.5" SSD	24

External disk storage systems

The following table lists the external storage systems that are supported by the x3630 M4 server and can be ordered through the System x sales channel. The server may support other disk systems that are not listed in this table. For further information, refer to the IBM System Storage Interoperation Center at: http://www.ibm.com/systems/support/storage/ssic

Table 36. External disk storage systems

Part number	Description
2071CU2	IBM Storwize V3500 LFF Dual Control Enclosure
2071CU3	IBM Storwize V3500 SFF Dual Control Enclosure
6099L2C	IBM Storwize V3700 3.5-inch Storage Controller Unit
6099S2C	IBM Storwize V3700 2.5-inch Storage Controller Unit
6099T2C	IBM Storwize V3700 2.5-inch DC Storage Controller Unit
6194L2C	IBM Storwize V5000 LFF Control Enclosure
6194LEU	IBM Storwize V5000 LFF Expansion Enclosure
6194S2C	IBM Storwize V5000 SFF Control Enclosure
6194SEU	IBM Storwize V5000 SFF Expansion Enclosure
6195SC5	IBM Storwize V7000 2.5-inch Storage Controller Unit
6195LEF	IBM Storwize V7000 3.5-inch Storage Expansion Unit
6195SEF	IBM Storwize V7000 2.5-inch Storage Expansion Unit

For more information, see the list of Lenovo Press Product Guides in the System Storage category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=externalstorage

External backup units

The server supports the external backup attachment options listed in the following table.

Table 37. External backup options

Part number	Description
External tape expansion enclosures for internal tape drives	
87651UX	1U Tape Drive Enclosure
87651NX	1U Tape Drive Enclosure (with Nema 5-15P LineCord)
Tape enclosure adapters (with cables)	
44E8869	USB Enclosure Adapter Kit
40K2599	SAS Enclosure Adapter Kit
Internal backup drives supported by external tape enclosures	
00D2786	RDX Internal USB 3.0 Dock with 320GB Cartridge
00D2787	RDX Internal USB 3.0 Dock with 500GB Cartridge
00D2788	RDX Internal USB 3.0 Dock with 1TB Cartridge
49Y9898	Half High LTO Gen 5 Internal SAS Tape Drive
00D8924	Half High LTO Ultrium Gen 6 Internal SAS Tape Drive
External backup units*	
362532Y	RDX External USB 3.0 Dock with 320GB Cartridge
362550Y	RDX External USB 3.0 Dock with 500GB Cartridge
36251TY	RDX External USB 3.0 Dock with 1TB Cartridge
3628L5X	Half High LTO Gen 5 External SAS Tape Drive (with US line cord)
3628N5X	Half High LTO Gen 5 External SAS Tape Drive (without line cord)

* These external tape drives can be ordered through the System x sales channel. The server might support other tape drives that are not listed in this table. See the IBM System Storage Interoperation Center (SSIC) for further information.

For more information, see the list of Lenovo Press Product Guides in the Backup units category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tape

Top-of-rack Ethernet switches

The server supports the top-of-rack Ethernet switches from Lenovo listed in the following table.

Table 38. Top-of-rack switches

Part number	Description
1 Gb top-of-rack switches	
7309BAX	RackSwitch G7028 (24 ports)
7309CAX	RackSwitch G7028 (48 ports)
0446013	RackSwitch G8000R
7309CFC	RackSwitch G8000F
7309G52	RackSwitch G8052R
730952F	RackSwitch G8052F
10 Gb top-of-rack switches	
7309DRX	RackSwitch G8264CS (Rear to Front)
7309DFX	RackSwitch G8264CS (Front to Rear)
7309BR6	RackSwitch G8124ER
7309BF7	RackSwitch G8124EF
7309G64	RackSwitch G8264R
730964F	RackSwitch G8264F
7309CR9	RackSwitch G8264TR
7309CF9	RackSwitch G8264TF
40 Gb top-of-rack switches	
8036BRX	RackSwitch G8332 (Rear to Front)
8036BFX	RackSwitch G8332 (Front to Rear)
8036ARX	RackSwitch G8316R
8036AFX	RackSwitch G8316F

For more information, see the list of Lenovo Press Product Guides in the Top-of-rack switches category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=tor

Additional edge switches are offered as part of the Intelligent Cluster program, as listed in the following table.

Table 39. Switches in the Intelligent Cluster program

Feature code	Description
1 Gb top-of-rack switches	
2733	Cisco 2960G-48TC-L (48 port, Layer 2)
Not available	Juniper EX4200 (48 port, Layer 2/3)
6941	SMC 8126L2 (26 port, Layer 2)
6673	SMC 8150L2 (50 port, Layer 2)
10 Gb top-of-rack switches	
A1M6	Cisco 3750X-48T-L (48 port, Layer 2/3)

Uninterruptible power supply units

The server supports attachments to the uninterruptible power supply (UPS) units that are listed in the following table.

Table 40. Uninterruptible power supply units

Part number	Description
Rack-mounted or tower UPS units	
55941AX	RT1.5kVA 2U Rack or Tower UPS (100-125VAC)
55941KX	RT1.5kVA 2U Rack or Tower UPS (200-240VAC)
55942AX	RT2.2kVA 2U Rack or Tower UPS (100-125VAC)
55942KX	RT2.2kVA 2U Rack or Tower UPS (200-240VAC)
55943AX	RT3kVA 2U Rack or Tower UPS (100-125VAC)
55943KX	RT3kVA 2U Rack or Tower UPS (200-240VAC)
55945KX	RT5kVA 3U Rack or Tower UPS (200-240VAC)
55946KX	RT6kVA 3U Rack or Tower UPS (200-240VAC)
55948KX	RT8kVA 6U Rack or Tower UPS (200-240VAC)
55949KX	RT11kVA 6U Rack or Tower UPS (200-240VAC)
55948PX	RT8kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
55949PX	RT11kVA 6U 3:1 Phase Rack or Tower UPS (380-415VAC)
Rack-mounted UPS units	
53951AX	1500VA LCD 2U Rack UPS (100V/120V)
53951KX	1500VA LCD 2U Rack UPS (230V)
53952AX	2200VA LCD 2U Rack UPS (100V/120V)
53952KX	2200VA LCD 2U Rack UPS (230V)
53953AX	3000VA LCD 3U Rack UPS (100 V/120 V)
53953JX	3000VA LCD 3U Rack UPS (200 V/208 V)
53956AX	6000VA LCD 4U Rack UPS (200 V/208 V)
53956KX	6000VA LCD 4U Rack UPS (230 V)
53959KX	11000VA LCD 5U Rack UPS (200V/208V/230V)

For more information, see the list of Lenovo Press Product Guides in the Power infrastructure category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power

Power distribution units

The server supports attachments to the power distribution units (PDUs) that are listed in the following table.

Table 41. Power distribution units (part 1)

Part number	Description
Switched and Monitored PDUs	
46M4002	1U 9 C19/3 C13 Active Energy Manager DPI® PDU
46M4003	1U 9 C19/3 C13 Active Energy Manager 60A 3 Phase PDU
46M4004	1U 12 C13 Active Energy Manager DPI PDU
46M4005	1U 12 C13 Active Energy Manager 60A 3 Phase PDU
46M4167	1U 9 C19/3 C13 Switched and Monitored 30A 3 Phase PDU
Enterprise PDUs	
71762MX	Ultra Density Enterprise PDU C19 PDU+ (WW)
71762NX	Ultra Density Enterprise PDU C19 PDU (WW)
71763MU	Ultra Density Enterprise PDU C19 3 Phase 60A PDU+ (NA)
71763NU	Ultra Density Enterprise PDU C19 3 Phase 60A PDU (NA)
39M2816	DPI C13 Enterprise PDU without linecord
39Y8923	DPI 60A Three Phase C19 Enterprise PDU with IEC309 3P+G (208 V) fixed power cord
39Y8941	DPI Single Phase C13 Enterprise PDU without power cord
39Y8948	DPI Single Phase C19 Enterprise PDU without power cord
Front-end PDUs	
39Y8934	DPI 32 amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8935	DPI 63amp/250 V Front-end PDU with IEC 309 2P+Gnd connector
39Y8938	30 amp/125 V Front-end PDU with NEMA L5-30P connector
39Y8939	30 amp/250 V Front-end PDU with NEMA L6-30P connector
39Y8940	60 amp/250 V Front-end PDU with IEC 309 60A 2P+N+Gnd connector

Table 41. Power distribution units (part 2)

Part number	Description
Universal PDUs	
39Y8951	DPI Universal Rack PDU with US LV and HV power cords
39Y8952	DPI Universal Rack PDU with CEE7-VII Europe LC
39Y8953	DPI Universal Rack PDU with Denmark LC
39Y8954	DPI Universal Rack PDU with Israel LC
39Y8955	DPI Universal Rack PDU with Italy LC
39Y8956	DPI Universal Rack PDU with South Africa LC
39Y8957	DPI Universal Rack PDU with UK LC
39Y8958	DPI Universal Rack PDU with AS/NZ LC
39Y8959	DPI Universal Rack PDU with China LC
39Y8962	DPI Universal Rack PDU (Argentina)
39Y8960	DPI Universal Rack PDU (Brazil)
39Y8961	DPI Universal Rack PDU (India)
0U Basic PDUs	
46M4122	0U 24 C13 16A 3 Phase PDU
46M4125	0U 24 C13 30A 3 Phase PDU
46M4128	0U 24 C13 30A PDU
46M4131	0U 24 C13 32A PDU
46M4140	0U 12 C19/12 C13 60A 3 Phase PDU
46M4143	0U 12 C19/12 C13 32A 3 Phase PDU

For more information, see the list of Lenovo Press Product Guides in the Power infrastructure category: http://www.redbooks.ibm.com/portals/systemx?Open&page=pg&cat=power

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Related publications and links

For more information, see these resources:

- U.S. Announcement Letter for NeXtScale PCIe Native Expansion Tray
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS114-063
- U.S. Announcement Letter for NeXtScale Storage Native Expansion Tray
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-219
- U.S. Announcement Letter for NeXtScale System
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS113-146
- NeXtScale System home page
  http://www.ibm.com/systems/x/hardware/highdensity/nextscale
- NeXtScale nx360 M4 Installation and Service Guide
  http://ibm.com/support/entry/portal/docdisplay?lndocid=migr-5093697
- NeXtScale n1200 Enclosure Installation and Service Guide
  http://ibm.com/support/entry/portal/docdisplay?lndocid=migr-5093698
- ServerProven hardware compatibility page for the nx360 M4
  http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/xseries/5455.html
- Lenovo Press Product Guides for System x servers and options
  http://www.redbooks.ibm.com/portals/systemx?Open&page=pgbycat
- Power Configurator
  http://ibm.com/systems/bladecenter/resources/powerconfig.html
- Configuration and Option Guide
  http://www.ibm.com/systems/xbc/cog/
- xREF - System x Reference
  http://www.redbooks.ibm.com/xref
- System x Support Portal
  http://ibm.com/support/entry/portal/
- Golden Eggs diagram for NeXtScale System
  http://www.goldeneggs.fi/documents/GE-IBM-BLADE-NEXT.pdf

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